Alignment of the ACT® Aspire® Summative Assessments to the Arkansas Content Standards

Final Report

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Executive Summary

ACT and the Arkansas Department of Education (ADE) contracted ACS Ventures, LLC (ACS) to design, lead, and report on an independent alignment study to evaluate the alignment of the ACT® Aspire® Performance Level Descriptors (PLDs) and test content to the Arkansas academic standards for grades 3-8 and high school[1] in English Language Arts (Reading, English, Writing), Mathematics, and Science.

The study design was created around three key questions:
- What level of cognitive processing is expected for students at each grade level for each standard or expectation?
- How do the ACT Aspire PLDs reflect the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?
- How does the ACT Aspire test content measure the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?

Educators from across the state of Arkansas convened during a four-day review to provide their expert judgments to answer these questions for the ACT Aspire assessment in each subject area and at each grade level. The key findings from the subsequent analysis of their ratings are summarized below.

Across all three subject areas, the panelists found that the Arkansas standards would likely require students to demonstrate a range of depth of knowledge (DOK) levels at each grade. For ELA and Mathematics, the Arkansas standards were largely centered on DOK levels 1-3 with a few specific standards targeting DOK level 4. For Science, these targets were slightly higher as the performance expectations are written to be encompassing of multiple expectations.

The ACT Aspire PLDs represent the full range of knowledge and skills that could be on a form of the ACT Aspire but are likely larger and more encompassing than any one test form could be. That being said, the panelists largely found alignment of the PLD elements to the Arkansas content standards, but with a few notable exceptions by grade/subject that are detailed in this report.

In terms of item-level alignment, there were substantial content connections between the ACT Aspire test forms and the Arkansas content standards but with some exceptions across subject areas/grades.

The study process and results are detailed within each section of this report.

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[1] The ACT Aspire high school assessment is administered at both the 9th and 10th grades in Arkansas. However, because it is the same assessment and the statewide content standards are written for all of high school (Science, Mathematics) or for the 9-10 grade span together (ELA), these grades are treated as one test/one set of standards.

ACS Ventures, LLC – *Bridging Theory & Practice*

Introduction

ACT and the Arkansas Department of Education (ADE) sought an independent alignment study to evaluate the alignment of the ACT® Aspire® performance level descriptors (PLDs) and test content to the Arkansas state standards for grades 3-8 and early high school (grades 9 & 10, EHS)[2] in English Language Arts (Reading, English, Writing), Mathematics, and Science. ACS Ventures, LLC (ACS) designed this study in collaboration with the Arkansas Department of Education (ADE) and the Arkansas Technical Advisory Committee (TAC) and was responsible for leading the operational components of the study and summarizing the findings in this report.

Alignment has been characterized several ways. One of the most common is from Webb (1997; 2006) who described alignment as "the degree to which expectations and assessments are in agreement and serve in conjunction with one another to guide the system toward students learning what they are expected to know and do" (p. 3). This definition, and other similar ones used in published literature, suggest that alignment information should be considered a key source of validity evidence for the use and interpretation of educational test scores. The unified perspective of validity suggests evaluating sources of evidence based on intended use and interpretation of test scores (e.g., Kane, 2006; Messick, 1989). As a key source of evidence in the test development process, it is important to ensure that test content supports the planned inferences by representing a sampling of the domain of the educational program (e.g., content framework, standards, test blueprint).

ADE selected ACT Aspire as the statewide summative assessment. Alignment information is necessary to determine how well ACT Aspire measures the critical knowledge and skills outlined in the Arkansas content standards. Information about each area of the standards and ACT Aspire is provided below.

Arkansas Content Standards

The Arkansas statewide content standards[3] are organized somewhat differently within each subject area, but each have a hierarchical structure where grade-level standards are organized within larger domains.

For ELA, the Arkansas academic standards begin with overarching anchor standards which are operationalized as grade-level standards. These grade-level standards are arranged within conceptual organizers in Reading, Language, and Writing (see Table 1). For Mathematics, the standards across each grade level are organized within domains (see Table 2). For Science, the standards are organized in three dimensions (see Table 3).

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[2] The ACT Aspire high school assessment is administered at both the 9th and 10th grades in Arkansas. However, because it is the same assessment and the statewide content standards are written for all of high school (Science, Mathematics) or for the 9-10 grade span together (ELA), these grades are treated as one test/one set of standards.

[3] The term "standard" is used throughout to reference the expectations framed for each grade and subject area. Within the state-level documents, these are referred to as "standards" in ELA and Mathematics but "performance expectations" in Science.

Table 1. Conceptual Organizers Across the Arkansas ELA Standards

Reading	Language	Writing
- Key Ideas and Details - Craft and Structure - Integration of Knowledge and Ideas - Range of Reading and Level of Text Complexity.[4] - Print Concepts.[5] - Phonological Awareness[3] - Phonics and Word Recognition[3] - Fluency[3]	- Conventions of Standard English - Knowledge of Language - Vocabulary Acquisition and Use	- Text Types and Purposes - Production and Distribution of Writing - Research to Build and Present Knowledge

Table 2. Domains Across the Arkansas Mathematics Standards

Grades 3-5	Grades 6-7	Grade 8	EHS
Operations and Algebraic Thinking	Ratios and Proportional Relationships	Functions	
Numbers and Operations in Base Ten	The Number System		Number and Quantity
Numbers and Operations – Fractions	Expressions and Equations		Algebra
Measurement and Data	Statistics and Probability		
Geometry			

Table 3. Dimensions of the Arkansas Science Standards

Disciplinary Core Ideas	Crosscutting Concepts	Science and Engineering Practices
- Physical Science (PS) - Life Science (LS) - Earth and Space Science (ESS) - Engineering, Technology and Applications of Science (ETS)	1. Patterns 2. Cause and effect 3. Scale, proportion, and quantity 4. Systems and system models 5. Energy and matter: Flows, cycles, and conservation 6. Structure and function 7. Stability and change	1. Asking questions (for science) and defining problems (for engineering) 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations (for science) and designing solutions (for engineering) 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information

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[4] These domains each include one broad standard that details the need for students to read across a variety of texts and write for a variety of purposes. These were not explicitly considered in the alignment given the breadth of each (all items could be aligned to these).

[5] The foundational standards (Print Concepts, Phonological Awareness, Phonics and Word Recognition, and Fluency Domains) are not new learnings of the grade level and therefore will not be included in tables/analyses represented in the rest of the report.

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ACT Aspire

ACT Aspire is a multi-component assessment system. The focus of this alignment study was on the summative assessment component for students in grades 3-8 and EHS in English Language Arts (Reading, English, and Writing), Mathematics, and Science. Item types include multiple-choice, text response, technology-enhanced, and extended constructed response (writing task). The test is computer-administered. After developing ACT Aspire, ACT convened a panel of subject matter experts to develop PLDs based on the performance of test takers on particular items. The PLDs are formatted as bulleted lists (of knowledge and skills) organized within each reporting category (see Figure 1 as an example; all ACT Aspire PLDs can be found online[6]).

Figure 1. Example ACT Aspire PLD

5th Grade English — Performance Level Descriptors

Reporting Categories	Needs Support	Close	Ready	Exceeding
Production of Writing (POW) Students apply their understanding of the rhetorical purpose and focus of a piece of writing to develop a topic effectively. They use various strategies to achieve logical organization, topical unity, and general cohesion in grade-level appropriate narrative and informational texts.	*A student performing at the Needs Support level:* • is working on determining the author's overall purpose in an essay. • is working on determining how individual sentences contribute to focus in an essay. • identifies logical relationships between main ideas in an essay. • identifies logical relationships between individual sentences in a paragraph.	*A student performing at the Close level:* • determines the author's purpose (e.g., to inform, to persuade) in a simple essay. • determines the purpose of a sentence, drawing on the context of adjacent sentences. • provides a sentence that introduces the main idea of a paragraph. • provides a sentence that concludes a paragraph. • uses a transition word or phrase to show obvious connections or contrasts between sentences in a paragraph.	*A student performing at the Ready level:* • determines the author's purpose in an essay as a whole and provides a supporting reason. • determines the purpose of a specific word or phrase within the context of a paragraph. • determines where a sentence best fits within a paragraph in order to complete or connect main ideas.	*A student performing at the Exceeding level:* • determines if a sentence or phrase is relevant to the topic and focus of an essay as a whole. • determines if a sentence or phrase is relevant to the topic and focus of a paragraph. • determines whether a sentence should be added or deleted to enhance the focus and cohesion of a paragraph. • determines where a sentence best fits within a paragraph to complete or connect supporting ideas.
Knowledge of Language (KLA) Students demonstrate effective language use through ensuring precision and concision in word choice and maintaining consistency in style and tone in grade-level appropriate narrative and informational texts.	*A student performing at the Needs Support level:* • is working on the knowledge and skills needed to indicate relationships in a sentence with a structure that is simple for fifth-grade students. • maintains a consistent formal or informal tone in a sentence with a structure that is simple for fifth-grade students.	*A student performing at the Close level:* • uses the appropriate word or phrase to express relationships within a sentence. • uses descriptive language within a sentence that is consistent with the overall formal or informal tone of the paragraph containing the sentence. • draws on the context of a sentence to make precise word choices.	*A student performing at the Ready level:* • combines two simple sentences, using a conjunction to express a contrast between the ideas in the two sentences. • uses descriptive language within a sentence that is consistent with the overall formal or informal tone of multiple paragraphs. • draws on the context of multiple sentences to make precise word choices.	*A student performing at the Exceeding level:* • uses the appropriate conjunction to precisely express a somewhat subtle relationship between ideas in a sentence. • uses descriptive language within a sentence that is consistent with the overall formal or informal tone and style of an essay.

The content of each ACT Aspire subject matter assessment is organized within reporting categories. The intended alignment between the ACT Aspire reporting categories and the domains within the Arkansas state standards is detailed in Appendix A (text provided by ACT)[7]. At a very high level within ELA, the ACT Aspire Assessments in Reading are intended to align to the AR Reading Standards whereas the ACT Aspire English and ACT Aspire Writing assessments are both aligned to the Arkansas Language and Writing standards. The ACT Aspire Mathematics Assessment is designed around the same domains as the Arkansas Mathematics Standards. For Science, the three reporting domains are aligned with the three dimensions of the Arkansas Science Standards. (See Appendix A for more details on the intended alignment.)

Study Methods

Overarching research questions

Based on the design of ACT Aspire and the organization of the Arkansas content standards, ACS designed an alignment study to answer the following questions:

1) What level of cognitive processing is expected for students at each grade level for each standard?
2) How do the ACT Aspire PLDs reflect the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?

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[6] https://www.discoveractaspire.org/performance-level-descriptors/

[7] Information provided directly by ACT

3) How does the ACT Aspire test content measure the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?

Each of these questions was addressed by gathering input from subject matter experts who were tasked with reviewing the ACT Aspire test information and identifying alignment to the state content standards. The following sections detail the process used to collect the information necessary to answer these questions.

Panelist qualifications

The ADE recruited panelists to serve as subject matter experts for this study. For ELA, seven panels were recruited (one for each grade level). For Science and Mathematics, four panels were recruited for each subject (3-4, 5-6, 7-8, EHS). Each panel included six[8] members who held roles within the state as curriculum/content experts, teachers, administrators, or another related role. Their qualifications are summarized for each panel in Tables 4, 5, and 6. Overall, these summaries show the panels represented a range of professional roles, districts within the state, substantial experience, and education/training for each panel.

Table 4. ELA Panel Demographics

		ELA 3	ELA 4	ELA 5	ELA 6	ELA 7	ELA 8	ELA HS	Total
Number		5	6	6	6	6	6	6	41
Professional Role									
	Curriculum/Content Expert	2	2	0	0	1	2	2	9
	Teacher	2	2	4	2	3	3	3	19
	Administrator	1	1	0	1	0	0	0	3
	Other	0	1	2	3	2	1	1	10
Number of School Districts Represented		5	6	6	6	6	6	6	41
Years of Experience (average)		19	22	21	20	16	19	19	19
Highest Degree Earned									
	Bachelors	0	1	1	0	3	1	0	6
	Masters	4	5	4	3	3	5	3	27
	Educational Specialist	1	0	1	3	0	0	2	7
	Doctorate	0	0	0	0	0	0	1	1

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[8] One ELA panel (ELA 3) only had 5 members as the sixth was unable to attend.

Table 5. Mathematics Panel Demographics

		Math 3-4	Math 5-6	Math 7-8	Math HS	Total
Number of Panelists		6	6	6	6	24
Professional Role						
	Curriculum/Content Expert	1	0	2	1	4
	Teacher	1	6	3	3	13
	Administrator	0	0	0	0	0
	Other	4	0	1	2	7
Number of School Districts Represented		6	6	6	6	24
Years of Experience (average)		16	14	14	24	17
Highest Degree Earned						
	Bachelors	2	2	2	2	8
	Masters	3	3	4	4	14
	Educational Specialist	1	1	0	0	2
	Doctorate	0	0	0	0	0

Table 6. Science Panel Demographics

		Science 3-4	Science 5-6	Science 7-8	Science EHS	Total
Number of Panelists		6	6	6	6	24
Professional Role						
	Curriculum/Content Expert	0	1	1	2	4
	Teacher	3	2	4	4	13
	Administrator	1	0	0	0	1
	Other	2	3	1	0	6
Number of School Districts Represented		6	6	6	6	24
Years of Experience (average)		18	18	14	11	15
Highest Degree Earned						
	Bachelors	0	1	1	0	2
	Masters	6	4	5	6	21
	Educational Specialist	0	1	0	0	1
	Doctorate	0	0	0	0	0

Meeting process

The meeting began on the first day with a welcome from Hope Worsham, Director of Assessment for ADE, who provided basic information about the purpose of the study, the role of the panelists as experts, and the security requirements for the study. Susan Davis-Becker, Ph.D. (ACS), provided the panelists with an orientation to the study including the types of ratings that panelists would be making and the major factors that should be considered. (Training materials are included in Appendix B.) The panelists then transitioned into the subject area rooms where the ACS facilitation team (Susan Davis-Becker, Andrew Wiley, Deborah Schnipke, Lauren Deters) provided subject-specific training on the organization of the standards, the structure of the tests, and how each alignment task would be operationalized in their subject area. This training also included a review of the depth of knowledge (DOK) scale that would be used to evaluate cognitive complexity. For this study, Webb's four DOK levels were described noting that the fourth level may be beyond the expectations for a summative exam:

Level 1: Recall and Reproduction
Level 2: Skills and Concepts
Level 3: Strategic Thinking/Reasoning
Level 4: Extended Thinking

The process was designed to allow panelists an opportunity to complete their alignment ratings independently, but also to discuss these ratings with other panelists and reach an overall group consensus. Each task was started with panelists reviewing a few standards/PLDs/items collectively and discussing the key features that they used to complete their ratings. Once this was completed, panelists rated the remaining items independently. After panelists had a chance to complete their independent ratings, the panels discussed their ratings together to reach a group consensus on the alignment. It was not necessary that every panelist agree 100% on the overall consensus rating; instead, it was designed to reflect the majority opinion of the group. Each specific task is described below.

Task 1: Standards Review

Key Question: What level of cognitive processing is expected for students at each grade level for each standard?

Panelists began by reviewing the standards and identifying the targeted cognitive level(s) for each of the grade-level standards. Specifically, panelists were asked to identify what depth of knowledge (DOK) level (or levels) a student would use when demonstrating the knowledge or skills within each individual standard. For orientation, each panel reviewed the first three standards at their grade level and discussed their ratings within the group. The remaining standards were evaluated by all panelists independently. Then the panel discussed their independent ratings to come to consensus. Given that some standards include a range of knowledge and skills, panelists could identify multiple DOK levels if appropriate. However, there was a limitation to this ability in that panelists were asked to focus on the target DOK for that grade level and not include foundational skills that were prerequisite to the grade level focus.

Task 2: PLD Alignment

Key Question: How do the ACT Aspire PLDs reflect the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?

Panelists were asked to review the PLDs for their grade/subject and identify the connection between the outlined elements of the PLDs and the relevant standards. Specifically, each PLD includes a series of elements that were identified based on a review of multiple ACT Aspire test forms (i.e., items classified within each performance level based on item difficulty and established cut scores). These were included as part of the alignment study design as they represent the breadth of knowledge and skills that may be measured as part of any given form. However, it is important to note that the full set of PLDs includes more knowledge and skills than would be measured by a form. Therefore, this view on alignment was included to provide an additional perspective but not to supersede the findings of the item/task alignment.

Although PLDs are typically organized within the four performance levels, for the purposes of this study, the panelists were asked to review the elements as one list within each subject area. The information was presented in this way to eliminate any bias that may occur due to panelists realizing an element was not at grade-level (below, above). Panelists were asked to rate each PLD element, both for the cognitive level and then the alignment to a particular standard(s). For cognitive complexity, panelists were tasked with identifying the DOK level characterized by the knowledge or skills described by the PLD element. For content alignment, panelists were asked to identify the standard(s) that included the described knowledge or skills. As with Task 1, panelists reviewed the first three elements together as a group (to become comfortable with the task) and then the remainder independently. Once all elements were reviewed, the panelists discussed their ratings to come to group consensus. When panelists could not find content alignment within grade-levels standards, they were asked to review those at lower grades to determine if clear alignment could be found[9]. However, this was not always possible given the depth of this task (i.e., panelists were asked not to spend extensive time on one PLD element by searching less familiar standards documents).

Task 3: Item/Task Alignment

Key Question: How does the ACT Aspire test content measure the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?

To address this third question, panelists were asked to review the test items of three test forms that had been administered in Arkansas the previous year. Specifically, panelists were asked to judge the cognitive complexity (DOK) required to answer the item correctly. From a content perspective, panelists were asked to identify the connection between the content standards and the knowledge, skills, and abilities required to answer the item correctly. As with the other tasks, each panel reviewed the first three items together and then reviewed the rest of the form independently, followed by discussion to come to consensus. When panelists could not find alignment within grade-levels standards, they were asked to review standards at adjacent grade levels to determine if clear alignment could be found. In some cases, this was possible but not always, depending on the depth of this task (i.e., panelists were asked not to spend extensive time on one item). After reviewing each form, the panels were asked to complete a series of ratings on their overall impression of the test forms and to record any summative thoughts they had about how the test form

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[9] The exception to this process was at Grade 3. Because the focus was on the standards that were to be measured by the summative assessment system, panelists were asked to focus on grades 3-EHS.

represented the major areas of the subject-area standards (conceptual organizers in ELA, domains in Mathematics, dimensions in Science).

For the Writing task, the ELA panels were asked to review a sample of three grade-level prompts, discuss the expectations in the scoring rubric at the target levels (e.g., those that indicate adequate or on grade-level performance) and then align the expectations in each dimension of the rubric (i.e., identify DOK levels as well as the standards alignment). In addition, each panel was asked to review the higher levels of the rubric and determine if students who scored at those levels would be demonstrating other DOK levels or knowledge/skills contained in other standards.

Although the nature of the ratings for this task paralleled those that panelists made in Task 2 for the PLDs, these were considered the main focus of the study as they represent the specific way in which the knowledge and skills, described in the PLDs, were operationalized in the test bank and sampled for a given test form. At the end of the study, the panelists were asked to complete an evaluation of the study. The schedule for the meeting is provided in Table 7. Some panels moved more quickly/slowly on particular tasks, but this shows the general organization of the tasks.

Table 7. General Schedule of Activities for the In-person Alignment Meeting

ELA Panels	Math & Science: 3-4, 5-6, 7-8	Math & Science EHS
Day 1		
Orientation *READING ALIGNMENT* ● TASK 1: Standards Review and CC Rating ● TASK 2: PLD Alignment	Orientation *GRADE 3/5/7* ● TASK 1: Standards Review and CC Rating ● TASK 2: PLD Alignment	Orientation *EHS* ● TASK 1: Standards Review and CC Rating ● TASK 2: PLD Alignment
Day 2		

● TASK 3: Item Alignment
  ○ Form 1
  ○ Form 2
  ○ Form 3
	● TASK 3: Item Alignment
	  ○ Form 1
	  ○ Form 2
	  ○ Form 3
		● TASK 3: Item Alignment
		  ○ Form 1
		  ○ Form 2

Day 3		

ENGLISH ALIGNMENT
● TASK 2: PLD Alignment
● TASK 3: English Item Alignment
  ○ Form 1
  ○ Form 2
	GRADE 4/6/8
	● TASK 1: Standards Review and CC Rating
	● TASK 2: PLD Alignment
	● TASK 3: Item Alignment
	  ○ Form 1
		EHS
		● TASK 3: Item Alignment
		  ○ Form 2
		  ○ Form 3
		● Evaluation & Wrap up

Day 4		

● TASK 3: English Item Alignment
  ○ Form 3
WRITING ALIGNMENT
● TASK 3: Writing task alignment
● Evaluation & Wrap up
	● TASK 3: Item Alignment
	  ○ Form 2
	  ○ Form 3
	● Evaluation & Wrap up	

Results

Overview of analysis approach

Following the study, the full set of consensus ratings for each grade-level within each subject were analyzed to address the questions identified for this study. The consensus ratings were the focus of this analysis as these represent the summation of the process by which panelists made independent judgments and then discussed them to determine the best judgment that represented the collection of their professional opinions. Therefore, the independent judgments were not included in this analysis given that they only represent one individual piece of information that was considered to determine the consensus rating. Each question is listed below along with an overview of the analysis approach.

    i.   *What level of cognitive processing is expected for students at each grade level for each standard?*

To answer this question, the consensus ratings for each content standard from Task 1 were summarized by content domain to show the distribution of expectations by DOK level for the grade level standards and for each domain.

    ii.   *How do the ACT Aspire PLDs reflect the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?*

To answer this question, the consensus ratings for each PLD element from Task 2 were analyzed to determine how many PLD elements were aligned to the relevant grade-level standards and then summarized by domain. In addition, the PLD elements aligned to each domain were analyzed to determine how many elements were at, below, or above the target DOK level(s) for the aligned standard. In the event that a standard had multiple DOK targets, aligned elements were considered a match if they had the same DOK level as any of the targets.[10].

    iii.   *How does the ACT Aspire test content measure the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?*

To answer this question, the consensus ratings for each item (scoring element in Writing) from Task 3 were analyzed to determine how many items (and/or scoring elements) were aligned to the grade-level standards and then summarized by domain. In addition, the items and task scoring elements aligned to each standard were analyzed to determine how many elements were at the target DOK level(s) for the standard or at/above the target DOK level(s). These results are also summarized across forms and by domain.

The following sections present the results in each of these categories by subject area.

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[10] Because the "match" could be to any DOK target identified for a standard, those standards with a DOK target of 1 would automatically have all aligned items fall within the "at/above" category.

English Language Arts

Although ACT Aspire includes separate measures for English, Reading, and Writing, Arkansas has one comprehensive set of standards for ELA (range from 69-74 standards across grades 3-EHS). The standards are organized around a set of anchor standards that are operationalized at each grade. Therefore, Task 1 was conducted for all ELA standards; Task 2 was conducted for the Reading and English PLDs (there are no separate Writing PLDs); and Task 3 was conducted for the Reading test, followed by the English test, and then the Writing task.

Standards

Table 8 below summarizes the DOK targets identified by each panel. Specifically, the values listed for each grade (bold text) indicate the percentage of standards that include a given DOK level as a target. These are further detailed at the domain level (conceptual organizer) for each grade. These percentages represent the proportion of standards, at a grade or within a conceptual organizer, that had skills aligned to each DOK level. For example at Grade 3, 50% of the standards within the *Key Ideas and Details* conceptual organizer were identified as including skills that were aligned with DOK 2. The percentages in each row sum to more than 100% when the panel identified multiple DOK targets for standards. All grades included DOK targets across levels 1-3 with a few standards targeting DOK 4 as well. There is a notable shift across grade levels in that the upper grades have a higher percentage of standards targeting DOK 3 skills.

Table 8. ELA Standard-level DOK Targets by Grade and Conceptual Organizer

Grade/Conceptual Organizer	Number	DOK 1	DOK 2	DOK 3	DOK 4
Grade 3	**66**	**43%**	**51%**	**27%**	**3%**
Key Ideas and Details	6	33%	50%	33%	0%
Craft and Structure	6	33%	33%	50%	0%
Integration of Knowledge and Ideas	5	20%	60%	80%	0%
Text Types and Purposes	15	13%	80%	47%	0%
Production and Distribution of Writing	3	0%	100%	33%	0%
Research to Build and Present Knowledge	3	0%	0%	100%	67%
Conventions of Standard English	15	80%	27%	0%	0%
Knowledge of Language	5	60%	60%	0%	0%
Vocabulary Acquisition and Use	8	25%	75%	0%	0%
Grade 4	**64**	**39%**	**33%**	**37%**	**6%**
Key Ideas and Details	6	33%	100%	17%	0%
Craft and Structure	6	17%	50%	33%	0%
Integration of Knowledge and Ideas	5	20%	60%	40%	40%
Text Types and Purposes	17	0%	18%	82%	0%
Production and Distribution of Writing	3	0%	0%	67%	33%
Research to Build and Present Knowledge	5	20%	20%	60%	20%
Conventions of Standard English	12	83%	17%	0%	0%
Knowledge of Language	3	33%	0%	67%	0%

Vocabulary Acquisition and Use	7	71%	29%	0%	0%
Grade 5	**65**	**23%**	**39%**	**39%**	**14%**
Key Ideas and Details	6	33%	67%	33%	0%
Craft and Structure	6	0%	33%	67%	17%
Integration of Knowledge and Ideas	5	0%	20%	80%	40%
Text Type and Purposes	17	0%	29%	71%	18%
Production and Distribution of Writing	3	0%	0%	100%	67%
Research to Build and Present Knowledge	5	0%	20%	60%	40%
Conventions of Standard English	13	62%	38%	0%	0%
Knowledge of Language	5	40%	60%	0%	0%
Vocabulary Acquisition and Use	5	20%	80%	0%	0%
Grade 6	**67**	**30%**	**37%**	**34%**	**12%**
Key Ideas and Details	6	17%	100%	33%	0%
Craft and Structure	6	0%	50%	83%	0%
Integration of Knowledge and Ideas	5	0%	0%	20%	80%
Text Types and Purposes	19	0%	37%	63%	5%
Production and Distribution of Writing	3	0%	33%	67%	0%
Research to Build and Present Knowledge	5	40%	40%	20%	60%
Conventions of Standard English	11	82%	18%	0%	0%
Knowledge of Language	3	33%	67%	0%	0%
Vocabulary Acquisition and Use	9	78%	22%	0%	0%
Grade 7	**67**	**16%**	**40%**	**60%**	**6%**
Key Ideas and Details	6	0%	67%	100%	0%
Craft and Structure	6	0%	33%	100%	0%
Integration of Knowledge and Ideas	5	0%	0%	100%	20%
Text Types and Purposes	19	0%	37%	79%	5%
Production and Distribution of Writing	3	0%	0%	100%	0%
Research to Build and Present Knowledge	5	0%	60%	60%	40%
Conventions of Standard English	10	60%	40%	0%	0%
Knowledge of Language	3	33%	33%	67%	0%
Vocabulary Acquisition and Use	10	40%	60%	0%	0%
Grade 8	**67**	**30%**	**37%**	**63%**	**19%**
Key Ideas and Details	6	33%	83%	67%	0%
Craft and Structure	6	0%	67%	83%	17%
Integration of Knowledge and Ideas	5	0%	0%	100%	60%
Text Types and Purposes	19	5%	21%	95%	11%
Production and Distribution of Writing	3	0%	0%	100%	67%
Research to Build and Present Knowledge	5	60%	60%	100%	100%

Conventions of Standard English	10	70%	30%	0%	0%
Knowledge of Language	2	100%	0%	50%	0%
Vocabulary Acquisition and Use	11	45%	55%	9%	0%
EHS	**66**	**33%**	**35%**	**58%**	**14%**
Key Ideas and Details	6	33%	83%	33%	0%
Craft and Structure	6	0%	83%	100%	0%
Integration of Knowledge and Ideas	5	0%	0%	20%	80%
Text Types and Purposes	19	0%	11%	100%	0%
Production and Distribution of Writing	3	67%	0%	67%	0%
Research to Build and Present Knowledge	5	40%	40%	60%	100%
Conventions of Standard English	10	90%	40%	0%	0%
Knowledge of Language	3	67%	67%	67%	0%
Vocabulary Acquisition and Use	9	56%	33%	33%	0%

Performance Level Descriptors

Table 9 details the results of the PLD alignment by grade. Alignment of the PLD elements indicates what proportion of the knowledge and skills that could be measured by the ACT Aspire are included within the grade-level standards. Each PLD element was identified as either aligning to the grade-level standards (one or more), standards above or below the focal grade-level (when one could be identified), the anchor standards (which define the summative expectations for students to develop over the grades), or not aligning (i.e., measuring some type of knowledge or skill not described in the grade-level standards). These findings indicate that at grade 3, 50 (79%) of the ACT Aspire PLDs were aligned to grade-level standards and the remaining 13 ACT Aspire PLDs (21%) were not aligned. In general, most of the PLD elements were aligned to the grade-level standards. However, there are a few areas where a notable percentage of PLD elements aligned to other grade levels (a specific standard at a grade above or below), the anchor standards.[11], or not aligning. It is important to note that in some cases these categories may be similar in that if panelists could not find a direct alignment in the adjacent grade levels, they may have recorded a "not aligning" judgment when the expectation could still be somewhere in the standards. Specifically, although panelists made every reasonable effort to find alignment in other grade-level standards if it could not be found in their grade-level standards, the lack of familiarity with these other standards and the overall factor of time may have limited their ability to find the best content alignment. These findings are further detailed by DOK level in Appendix C.

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[11] The anchor standards represent the overarching expectations from which the grade-level standards are written. Alignment to the anchor standards indicates that the panel did not find direct alignment to the grade-level standards but felt the knowledge or skill was included in the anchor standard. This type of alignment may be viewed in the same way as alignment to standards above or below the focal grade level.

Table 9. Aligned PLD Elements by Grade

Grade	PLD	Grade level	Above	Below	Anchor	Not	Total
3	Reading	50 (79%)	0 (0%)	0 (0%)	0 (0%)	13 (21%)	63
3	English	32 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	32
4	Reading	50 (75%)	8 (12%)	0 (0%)	8 (12%)	1 (1%)	67
4	English	31 (79%)	1 (3%)	3 (8%)	1 (3%)	3 (8%)	39
5	Reading	58 (83%)	0 (0%)	0 (0%)	0 (0%)	12 (17%)	70
5	English	33 (79%)	0 (0%)	0 (0%)	9 (21%)	0 (0%)	42
6	Reading	60 (90%)	0 (0%)	0 (0%)	0 (0%)	7 (10%)	67
6	English	43 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	43
7	Reading	75 (96%)	0 (0%)	0 (0%)	3 (4%)	0 (0%)	78
7	English	79 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	79
8	Reading	79 (100%)	0 (0%)	0 (0%)	3 (4%)	0 (0%)	78
8	English	70 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	79
EHS	Reading	65 (98%)	0 (0%)	0 (0%)	0 (0%)	1 (2%)	66
EHS	English	70 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	70

ACT Aspire Test Content

Table 10 below shows the percentage of multiple-choice items identified as targeting each DOK level across all ELA assessments. These results show that each grade-level assessment included items targeting all three levels of DOK. The alignment of these items to the Arkansas academic content standards is detailed in Table 11. Specifically, each item/task scoring element was identified as either aligning to the grade-level standards, standards above or below the focal grade-level, anchor standards[12], or not aligning (i.e., measuring knowledge and skills not articulated in the grade-level standards). The percentage of items identified as aligned reflects the average number of items aligned across each of the three test forms that were reviewed by the panelists. In addition to the average, the range of the percentage of items aligned across all three test forms is also provided to show the differences across forms. Overall, most content was found to align to the grade-level standards with a small amount targeting standards at lower grades. For two grade levels (4 and 5), the panels felt the specific task/style of writing was not included in the grade-level standards as it was not the type of writing that is the focus at that grade level. However, the panel did indicate that the style of writing in the ACT Aspire is part of the anchor standard (rather than the grade-level standard).

These findings are further detailed in Table 12, which shows the alignment to each domain within each grade by the number of aligned items, the percentage of these items that matched the DOK target(s) (i.e., at the same level) and the percentage that were at or above the DOK target(s). From a DOK perspective, a large proportion of items matched the DOK target of the aligned standard and an even larger proportion were at

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[12] The anchor standards represent the overarching expectations from which the grade-level standards are written. Alignment to the anchor standards indicates that the panel did not find direct alignment to the grade-level standards but felt the knowledge or skill was included in the anchor standard. This type of alignment may be viewed in the same way as alignment to standards above or below the focal grade level.

or above the DOK target of the aligned standard. The scoring elements of the Writing task are listed as they aligned to the conceptual organizers at each grade. These are coded as:

      I&A = Ideas and Analysis

      D&S = Development and Support

      OR = Organization

      LUC = Language Use and Conventions.

DOK is not reported for writing as all scoring elements were at or above the targeted DOK level.

Table 10. Percentage of ELA Items by DOK Level

Grade	DOK 1	DOK 2	DOK 3
3	28%	62%	10%
4	34%	50%	17%
5	7%	79%	15%
6	43%	55%	3%
7	33%	62%	4%
8	32%	54%	15%
EHS	31%	44%	24%

Table 11. Alignment of ELA Test Items by Grade

Grade		Items /Form	Avg. Aligned	Percent	Range	Above	Below	Anchor	Not
3	Reading	31	24.0	77%	74%-81%	0%	0%	0%	23%
	English	39	37.7	97%	95%-97%	0%	0%	0%	3%
	Writing	4	4	100%	--	0%	0%	0%	0%
4	Reading	31	24.0	77%	58%-100%	0%	0%	10%	13%
	English	39	35.0	90%	87%-92%	4%	5%	0%	3%
	Writing	4	3	75%	--	25%	0%	0%	0%
5	Reading	31	27.3	88%	77%-94%	0%	0%	11%	1%
	English	39	37.3	96%	92%-97%	0%	0%	4%	0%
	Writing	4	3	75%	--	25%	0%	0%	0%
6	Reading	32	31.3	98%	97%-100%	0%	0%	0%	2%
	English	45	45.0	100%	100%-100%	0%	0%	0%	0%
	Writing	4	4	100%	--	0%	0%	0%	0%
7	Reading	32	31.7	99%	97%-100%	0%	0%	0%	1%
	English	45	45.0	100%	100%-100%	0%	0%	0%	0%
	Writing	4	4	100%	--	0%	0%	0%	0%
8	Reading	32	31.7	99%	97%-100%	0%	0%	0%	1%
	English	45	45.0	100%	100%-100%	0%	0%	0%	0%
	Writing	4	4	100%	--	0%	0%	0%	0%
EHS	Reading	32	32.0	100%	100%-100%	0%	0%	0%	0%
	English	62	62.0	100%	100%-100%	0%	0%	0%	0%
	Writing	4	4	100%	--	0%	0%	0%	0%

Table 12. Alignment and DOK Comparison of Test Items by Grade and Domain

Grade/Conceptual Organizer	Reading					English					Writing
	Aligned Items	At DOK	At DOK (Range)	At/Above DOK	At/Above DOK (Range)	Aligned Items	At DOK	At DOK (Range)	At/Above DOK	At/Above DOK (Range)	Aligned Score Categories
Grade 3											
Key Ideas and Details	18.7	66%	59%-70%	97%	94%-100%	5.0	72%	50%-100%	94%	83%-100%	
Craft and Structure	6.0	54%	40%-71%	72%	60%-83%	2.0	83%	50%-100%	83%	50%-100%	
Integration of Knowledge and Ideas	3.0	64%	50%-75%	64%	50%-75%	0.0					
Text Types and Purposes	0.0					7.0	84%	80%-90%	90%	80%-100%	I&A, D&S, OR
Production and Distribution of Writing	0.0					12.3	89%	83%-92%	89%	83%-92%	
Research to Build and Present Knowledge	0.0					0.0					
Conventions of Standard English	0.0					24.3	85%	76%-91%	99%	96%-100%	LUC
Knowledge of Language	0.0					9.3	90%	80%-100%	100%	100%-100%	
Vocabulary Acquisition and Use	0.3	100%	100%-100%	100%	100%-100%	4.3	44%	33%-60%	44%	33%-60%	
Grade 4											
Key Ideas and Details	19.0	82%	78%-90%	93%	90%-95%	0.0					
Craft and Structure	3.0	69%	33%-100%	89%	67%-100%	0.0					
Integration of Knowledge and Ideas	0.3	100%	100%-100%	100%	100%-100%	0.0					

Text Types and Purposes	0.0					9.7	23%	8%-38%	23%	8%-38%	D&S, OR, LUC, [13]
Production and Distribution of Writing	0.0					2.7	64%	25%-100%	64%	25%-100%	
Research to Build and Present Knowledge	0.0					0.0					
Conventions of Standard English	0.0					20.0	79%	65%-95%	79%	65%-95%	LUC
Knowledge of Language	0.0					2.3	29%	25%-33%	29%	25%-33%	LUC
Vocabulary Acquisition and Use	0.3	0%	0%-0%	100%	100%-100%	6.3	59%	50%-67%	64%	50%-83%	
Grade 5											
Key Ideas and Details	24.7	85%	80%-88%	93%	92%-96%	0.0					
Craft and Structure	9.7	55%	44%-67%	66%	56%-78%	0.0					
Integration of Knowledge and Ideas	0.7	100%	100%-100%	100%	100%-100%	0.0					
Text Type and Purposes	0.0					2.7	22%	0%-33%	22%	0%-33%	D&S, OR, [5]
Production and Distribution of Writing	0.0					9.0	30%	20%-44%	30%	20%-44%	
Research to Build and Present Knowledge	0.0					1.3	67%	0%-100%	67%	0%-100%	
Conventions of Standard English	0.0					24.0	26%	17%-37%	98%	93%-100%	LUC

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[13] Ideas and Analysis for 4th and 5th grades was aligned to the Anchor standard #1 under Text Types and Purposes but the style of writing was different than what is in the grade-level standards.

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Knowledge of Language	2.0	100%	100%-100%	100%	100%-100%	0.7	100%	100%-100%	100%	100%-100%	
Vocabulary Acquisition and Use	0.0					7.3	80%	67%-90%	100%	100%-100%	
Grade 6											
Key Ideas and Details	22.3	66%	61%-70%	70%	65%-76%	0.0					
Craft and Structure	11.0	55%	45%-64%	55%	45%-64%	0.0					
Integration of Knowledge and Ideas	1.0	0%	0%-0%	0%	0%-0%	0.0					
Text Type and Purposes	0.0					0.0					I&A, D&S, OR, LUC
Production and Distribution of Writing	0.0					0.0					I&A, D&S, OR, LUC
Research to Build and Present Knowledge	0.0					10.7	3%	0%-10%	3%	0%-10%	I&A, D&S, OR
Conventions of Standard English	0.0					22.7	0%	0%-0%	0%	0%-0%	LUC
Knowledge of Language	0.0					0.0					D&S, LUC
Vocabulary Acquisition and Use	4.3	92%	75%-100%	100%	100%-100%	27.3	93%	90%-96%	93%	90%-96%	I&A, D&S, OR, LUC
Grade 7											
Key Ideas and Details	22.3	51%	48%-52%	51%	48%-52%	0.3	100%	100%-100%	100%	100%-100%	
Craft and Structure	11.7	53%	43%-67%	53%	43%-67%	1.0	33%	0%-100%	33%	0%-100%	
Integration of Knowledge and Ideas	0.3	0%	0%-0%	0%	0%-0%	0.0					
Text Types and Purposes	0.0					0.0					I&A, D&S, OR, LUC

Production and Distribution of Writing	0.0					0.0					I&A, D&S, OR, LUC
Research to Build and Present Knowledge	0.0					10.3	10%	0%-18%	10%	0%-18%	
Conventions of Standard English	0.0					1.7	0%	0%-0%	0%	0%-0%	LUC
Knowledge of Language	0.0					0.0					LUC
Vocabulary Acquisition and Use	4.0	75%	50%-100%	100%	100%-100%	38.3	71%	68%-73%	76%	76%-76%	
Grade 8											
Key Ideas and Details	36.7	83%	79%-86%	95%	90%-100%	0.0					
Craft and Structure	8.3	80%	75%-86%	80%	75%-86%	4.0	89%	67%-100%	89%	67%-100%	
Integration of Knowledge and Ideas	1.0	100%	100%-100%	100%	100%-100%	0.0					
Text Types and Purposes	0.0					0.0					I&A, D&S, OR, LUC
Production and Distribution of Writing	0.0					0.0					D&S, OR
Research to Build and Present Knowledge	2.7	89%	67%-100%	89%	67%-100%	11.3	14%	13%-17%	14%	13%-17%	
Conventions of Standard English	0.0					13.0	0%	0%-0%	0%	0%-0%	LUC
Knowledge of Language	0.0					0.0					LUC
Vocabulary Acquisition and Use	0.0					26.7	93%	86%-96%	94%	89%-96%	

EHS											
Key Ideas and Details	30.0	83%	75%-88%	95%	89%-100%	0.0					
Craft and Structure	16.0	76%	68%-83%	76%	68%-83%	10.0	98%	93%-100%	98%	93%-100%	
Integration of Knowledge and Ideas	1.7	0%	0%-0%	0%	0%-0%	0.0					
Text Types and Purposes	0.0					0.0					I&A, D&S, OR, LUC
Production and Distribution of Writing	0.3	0%	0%-0%	0%	0%-0%	0.0					I&A, D&S, OR, LUC
Research to Build and Present Knowledge	0.7	100%	100%-100%	100%	100%-100%	11.7	39%	24%-50%	39%	24%-50%	
Conventions of Standard English	0.0					26.3	32%	5%-52%	56%	44%-80%	LUC
Knowledge of Language	5.3	90%	83%-100%	90%	83%-100%	0.0					OR, LUC
Vocabulary Acquisition and Use	5.0	87%	75%-100%	87%	75%-100%	53.0	86%	80%-94%	98%	97%-98%	

Finally, each panel was asked to provide summative feedback on the level of text complexity across the ELA assessments. From an alignment perspective, this was a larger picture review as to whether the text samples were appropriate for the grade-level assessment. These comments are included in Appendix D.

There were a few key findings that emerged when reviewing the results across the three tasks.
- In general, there was substantial alignment of the ACT Aspire test materials (PLDs and test items) to the Arkansas ELA standards. The alignment was notably greater at the higher grades with almost 100% of items in grade 6, 7, 8 and EHS aligned. Lower grades levels had between 75% and 95% of items aligned to the Arkansas standards.
- For the ACT Aspire items, the panels at grades 3-5 all independently flagged items for lack of fit to the grade level standards (either marked as "not aligned" or "aligned to anchor standards") based on the specific question that was being asked. There were similar comments provided about uncertainty as to what an item was asking for when the phrasing "main purpose" was used.
- For the PLDs, the elements largely aligned to the grade-level standards. However, there was some misalignment (either marked as "not aligned" or "aligned to the anchor standards") in the lower grades (grades 3-6) pertaining to the *Integration of Knowledge and Ideas* reporting category. The difference here between those identified as "not aligned" and "aligned to the anchor standards" might be whether they could make the connection to the other parts of the standards. However, no consistent pattern could be identified within this category (e.g., the misalignment was all from one performance level).

Mathematics

Standards

Table 13 below summarizes the DOK targets identified by each panel. The values listed for each grade (bold text) indicate the percentage of standards that include a given DOK level as a target. These are further detailed at the domain level for each grade. As an example, 22% of the Grade 3 standards within the *Operations and Algebraic Thinking* domain included skills at the DOK 3 level. The percentages in each row sum to more than 100% when the panel identified multiple DOK targets for standards. All grades included DOK targets across levels 1-3, and the EHS panel identified a couple of standards in the Geometry domain that could allow students to demonstrate DOK 4.

Table 13. DOK Targets for Standards by Grade and Domain

Grade/Domain	Number	DOK 1	DOK 2	DOK 3	DOK 4
Grade 3	**28**	**61%**	**64%**	**11%**	**0%**
Operations and Algebraic Thinking	9	67%	67%	22%	0%
Numbers and Operations in Base Ten	6	83%	50%	0%	0%
Numbers and Operations - Fractions	3	33%	33%	33%	0%
Measurement and Data	8	38%	75%	0%	0%
Geometry	2	100%	100%	0%	0%
Grade 4	**28**	**39%**	**79%**	**29%**	**0%**
Operations and Algebraic Thinking	5	20%	100%	40%	0%
Numbers and Operations in Base Ten	6	50%	67%	33%	0%
Numbers and Operations - Fractions	7	14%	86%	57%	0%

Measurement and Data	7	43%	71%	0%	0%
Geometry	3	100%	67%	0%	0%
Grade 5	**26**	**77%**	**65%**	**23%**	**0%**
Operations and Algebraic Thinking	3	67%	67%	33%	0%
Numbers and Operations in Base Ten	7	100%	43%	14%	0%
Numbers and Operations - Fractions	7	71%	86%	57%	0%
Measurement and Data	5	80%	40%	0%	0%
Geometry	4	50%	100%	0%	0%
Grade 6	**29**	**100%**	**55%**	**10%**	**0%**
Ratios and Proportional Relationships	3	100%	67%	0%	0%
The Number System	8	100%	63%	13%	0%
Expressions and Equations	9	100%	11%	11%	0%
Statistics and Probability	5	100%	80%	20%	0%
Geometry	4	100%	100%	0%	0%
Grade 7	**24**	**58%**	**79%**	**50%**	**0%**
Ratios and Proportional Relationships	3	67%	67%	33%	0%
The Number System	3	100%	100%	67%	0%
Expressions and Equations	4	75%	100%	25%	0%
Statistics and Probability	8	25%	50%	75%	0%
Geometry	6	67%	100%	33%	0%
Grade 8	**28**	**57%**	**96%**	**50%**	**0%**
Functions	5	20%	100%	60%	0%
The Number System	2	50%	50%	0%	0%
Expressions and Equations	8	63%	100%	38%	0%
Statistics and Probability	4	75%	100%	75%	0%
Geometry	9	67%	100%	56%	0%
Grade 9	**88**	**20%**	**67%**	**40%**	**2%**
Functions	15	20%	87%	33%	0%
Number and Quantity	5	20%	100%	20%	0%
Algebra	21	38%	67%	29%	0%
Statistics and Probability	8	38%	100%	13%	0%
Geometry	39	8%	49%	56%	5%

Performance Level Descriptors

Table 14 details the results of the PLD alignment by grade. Specifically, each PLD element was identified as either aligning to the grade-level standards (or practices), standards above or below the focal grade level, or not aligning. The "not" means the panelists could not find it anywhere explicitly in the standards (does not mean it does not exist at all). The 3rd grade panel was provided a copy of the 1st and 2nd grade standards and, in some cases, found alignment to those. In general, most of the PLD elements aligned to the grade-level standards, but there is a substantial proportion at some grade levels aligned to lower grade levels. These findings are further detailed by DOK level in Appendix C.

Table 14. Alignment of PLD Elements by Grade

Grade	Grade	Grade level	Above	Below	Not	Total
3	Grade 3	108 (81%)	1 (1%)	1 (1%)	24 (18%)	134
4	Grade 4	124 (80%)	1 (1%)	20 (13%)	10 (6%)	155
5	Grade 5	143 (95%)	0 (0%)	7 (5%)	0 (0%)	150
6	Grade 6	115 (88%)	0 (0%)	15 (12%)	0 (0%)	130
7	Grade 7	180 (99%)	0 (0%)	0 (0%)	1 (1%)	181
8	Grade 8	129 (86%)	0 (0%)	19 (13%)	2 (1%)	150
EHS	EHS	164 (67%)	0 (0%)	62 (25%)	20 (8%)	246

ACT Aspire Test Content

Table 15 shows the percentage of items at each grade level identified as targeting each DOK level. As shown in these results, there were items at each grade-level assessment that targeted each DOK level. Table 16 details the results of the ACT Aspire test item alignment by grade. Specifically, each item was identified as either aligning to the grade-level standards, standards above the focal grade level, standards below the focal grade level, or not aligning. Similar to the PLD alignment, the rating of "not" means the panelists could not locate it within the standards (either grade-level or those just above or below). However, it may have existed in a different grade level where panelists could not locate it within a reasonable amount of time. The percentage of items identified as aligned reflects the average number of items aligned across each of the three test forms that were reviewed by the panelists. In addition to the average, the range of the percentage of items aligned across all three test forms is also provided. Overall, the items appear to be largely aligned to the grade-level standards, but more test content at the higher grades was determined to be targeting lower grade standards (e.g. the EHS test targeted 8th grade standards).

These findings are further detailed in Table 17, which shows the alignment to each domain within each grade by the number of aligned items, the percentage of these items that matched the DOK target(s) (i.e., at the same level), and the percentage that were at or above the DOK target(s). From a DOK perspective, a large proportion of items matched the DOK target of the aligned standard, and an even larger proportion were at or above the DOK target of the aligned standards.

Table 15. Percentage of Mathematics Items by DOK Level

Grade	DOK 1	DOK 2	DOK 3
3	28%	51%	21%
4	23%	57%	20%
5	53%	43%	4%
6	54%	36%	11%
7	17%	55%	28%
8	22%	61%	17%
EHS	17%	38%	44%

Table 16. Alignment of Test Items by Grade

Grade	Items/form	Avg. aligned	Percent	Range	Above	Below	Not
3	35	30.0	86%	83%-91%	0%	12%	2%
4	35	29.3	84%	80%-91%	0%	10%	6%
5	35	31.3	90%	89%-91%	0%	10%	0%
6	42	38.0	90%	86%-93%	0%	10%	0%
7	42	35.3	84%	81%-90%	0%	16%	0%
8	48	29.0	60%	58%-65%	0%	40%	0%
EHS	48	29.7	62%	58%-65%	2%[14]	28%	8%

Table 17. Alignment and DOK Comparison of Test Items by Grade and Domain

Grade/Domain	Items (Avg.)	At DOK Target		At/Above DOK Target	
		Avg.	Range	Avg.	Range
Grade 3					
Operations and Algebraic Thinking	12.3	59%	33%-77%	70%	50%-92%
Numbers and Operations in Base Ten	11.0	72%	62%-86%	100%	100%-100%
Numbers and Operations - Fractions	5.0	53%	40%-60%	73%	60%-100%
Measurement and Data	8.3	57%	44%-71%	79%	71%-89%
Geometry	5.7	82%	80%-83%	100%	100%-100%
Grade 4					
Operations and Algebraic Thinking	7.7	87%	75%-100%	96%	88%-100%
Numbers and Operations in Base Ten	7.7	82%	71%-89%	90%	86%-100%
Numbers and Operations - Fractions	6.7	63%	50%-75%	63%	50%-75%
Measurement and Data	7.3	72%	33%-100%	93%	78%-100%
Geometry	5.0	67%	60%-75%	100%	100%-100%
Grade 5					
Operations and Algebraic Thinking	4.0	83%	75%-100%	92%	75%-100%
Numbers and Operations in Base Ten	10.0	94%	90%-100%	100%	100%-100%
Numbers and Operations - Fractions	9.7	75%	70%-83%	83%	80%-86%
Measurement and Data	16.7	84%	73%-100%	91%	73%-100%
Geometry	7.3	66%	60%-71%	72%	60%-83%
Grade 6					
Ratios and Proportional Relationships	7.0	100%	100%-100%	100%	100%-100%
The Number System	12.3	79%	75%-82%	100%	100%-100%
Expressions and Equations	16.0	61%	53%-67%	100%	100%-100%
Geometry	5.7	94%	83%-100%	100%	100%-100%
Statistics and Probability	8.3	96%	89%-100%	100%	100%-100%

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[14] These items were identified as aligning to the Algebra 2 Standards.

Grade 7					
Ratios and Proportional Relationships	9.0	74%	63%-89%	100%	100%-100%
The Number System	8.3	96%	89%-100%	100%	100%-100%
Expressions and Equations	7.3	75%	60%-86%	79%	60%-90%
Geometry	7.3	72%	57%-88%	90%	86%-100%
Statistics and Probability	6.3	46%	17%-71%	67%	50%-86%
Grade 8					
The Number System	3.0	44%	0%-67%	67%	67%-67%
Expressions and Equations	12.0	86%	80%-92%	88%	80%-93%
Functions	7.0	66%	60%-75%	77%	63%-88%
Geometry	7.0	94%	83%-100%	94%	83%-100%
Statistics and Probability	5.7	100%	100%-100%	100%	100%-100%
EHS (Algebra & Geometry)					
Number and Quantity	1.0	67%	0%-100%	100%	100%-100%
Algebra	11.3	69%	54%-90%	80%	73%-90%
Functions	7.3	24%	13%-33%	78%	63%-88%
Statistics and Probability	3.3	58%	33%-75%	78%	33%-100%
Geometry	9.3	45%	27%-75%	64%	36%-88%

Overall, the results from this analysis suggest the content of the PLDs and the ACT Aspire test forms aligned to the Arkansas Mathematical Standards and Practices. There were a few specific findings that emerged when reviewing the results across the three tasks.

- At grade 3, the panel highlighted some specific knowledge and skills in the area of fractions that were not aligned (based on Task 2 results and summative comments from tasks 2 and 3).
- At grades 4, 5, and 6, the PLD elements that were aligned to below--grade level standards were largely concentrated in the *Integrating Essential Skills* section.
- At grade 8, a large percentage of PLD elements aligned to below-grade standards were from the *Integrating Essential Skills* reporting category with some from the *Mathematical Practices* category. Similarly, a large percentage of test items were linked to the below-grade level standards.
- For EHS a large percentage of the PLD elements were targeting standards at 7th and 8th grade, but were spread across the reporting categories. Further review of the consensus ratings found some of the elements marked as "not aligning" included comments like, "nothing specific in standards but this should be understood." Similarly, a large percentage of test items were linked to the below-grade level standards. The panelists highlighted this finding in their evaluation comments (detailed in the next section).

Science

For Science, the rating and analysis process was designed to be as consistent as possible with the other subject areas but was somewhat different considering that Science incorporates the three dimensions of knowledge and skills. The Arkansas Science Standards provide information on the performance expectations within each grade level. Student performance expectations consistent of three dimensions: science and engineering practices (SEPs), disciplinary core ideas (DCIs), and crosscutting concepts (CCs). For the

alignment, panelists were asked to rate the DOK target for each PE (and by association, the linked CCs and SEPs).

Standards

Table 18 below summarizes the DOK targets identified by each panel for the PEs within each grade level. Specifically, the values listed for each grade (bold text) indicate the percentage of PEs that include a given DOK level as a target. These are further detailed at the domain level for each grade. The percentages in each row sum to more than 100% when the panel identified multiple DOK targets for PEs. All grades included DOK targets at levels 2 and 3. Most panels identified some DOK 4 targets; the EHS panel identified PEs that could allow students to demonstrate DOK 1.

Table 18. DOK Targets for Standards by Domain

Grade/DCI	Number	DOK 1	DOK 2	DOK 3	DOK 4
Grade 3	**18**	**0%**	**61%**	**44%**	**11%**
Life Science	8	0%	63%	63%	0%
Physical Science	4	0%	75%	25%	25%
Earth and Space Science	3	0%	67%	33%	0%
Engineering, Technology and Applications of Science	3	0%	33%	33%	33%
Grade 4	**17**	**0%**	**12%**	**76%**	**12%**
Life Science	2	0%	0%	100%	0%
Physical Science	7	0%	0%	86%	14%
Earth and Space Science	5	0%	20%	80%	0%
Engineering, Technology and Applications of Science	3	0%	33%	33%	33%
Grade 5	**16**	**0%**	**13%**	**88%**	**0%**
Life Science	2	0%	0%	100%	0%
Physical Science	6	0%	0%	100%	0%
Earth and Space Science	5	0%	20%	80%	0%
Engineering, Technology and Applications of Science	3	0%	33%	67%	0%
Grade 6	**20**	**0%**	**0%**	**55%**	**45%**
Life Science	7	0%	0%	100%	0%
Physical Science	3	0%	0%	67%	33%
Earth and Space Science	6	0%	0%	33%	67%
Engineering, Technology and Applications of Science	4	0%	0%	0%	100%
Grade 7	**22**	**0%**	**14%**	**59%**	**32%**
Life Science	7	0%	14%	86%	14%
Physical Science	6	0%	17%	67%	17%
Earth and Space Science	5	0%	20%	60%	20%
Engineering, Technology and Applications of Science	4	0%	0%	0%	100%

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Grade 8	**25**	**0%**	**12%**	**52%**	**40%**
Life Science	7	0%	29%	57%	29%
Physical Science	10	0%	10%	60%	30%
Earth and Space Science	4	0%	0%	75%	25%
Engineering, Technology and Applications of Science	4	0%	0%	0%	100%
EHS	**74**	**11%**	**15%**	**65%**	**31%**
Life Science	29	21%	14%	62%	14%
Physical Science	16	6%	31%	69%	25%
Earth and Space Science	16	6%	13%	81%	31%
Engineering, Technology and Applications of Science	13	0%	0%	46%	77%

Performance Level Descriptors

The PLDs developed for Science ACT Aspire tests represent PLDs focused on the scientific process that students should be able to perform, rather than specific content knowledge. As a result, the PLDs are written in such a way that the process described (e.g. translates simple data into a table, graph or diagram) could be applicable to multiple DCIs, SEPs, or CCCs. For the second task, each PLD element was evaluated for alignment to the disciplinary core ideas (through the performance expectations), the science engineering practices, the crosscutting concepts, or some combination of the three dimensions.

Table 19 below details the results of the PLD alignment by grade. Across the grade levels, the panels were able to identify some clear connections to particular SEPs or CCCs. The table shows what percentage of PLD elements at each grade were aligned to one or more CCCs or SEPs. With respect to the DCIs, as described above, the panels all felt the PLD elements were written in a way that focused on process and could be assessed within any of the DCIs. However, whereas the PLD element was written in such a way that it could not be aligned to a single DCI, the panelists agreed that it could actually be applied to *any* of the DCIs. In effect, the PLD element was considered to be aligned and consistent with the DCIs but not to a single one. Therefore, they suggested that each PLD element could be aligned to most or all of the DCIs. This alignment was further analyzed by DOK (see Appendix C).

Table 19. Alignment of PLD elements by Grade

Grade	DCIs (PEs)	Crosscutting Concepts	Science and Engineering Practices
3	(Potentially) All	76%	90%
4	(Potentially) All	82%	94%
5	(Potentially) All	54%	92%
6	(Potentially) All	45%	92%
7	(Potentially) All	87%	85%
8	(Potentially) All	89%	90%
EHS	(Potentially) All	67%	96%

ACT Aspire Test Content

The DOK levels of all Science items reviewed are summarized in Table 20. As shown in these results, there were items at each grade-level assessment that targeted each DOK level. Table 21 below details the results of the ACT Aspire test item alignment by grade. Specifically, each item was evaluated for alignment to each of the three dimensions (DCIs/PEs, CCCs, or SEPs). Overall, the items appear to be largely aligned to the SEPs at all grades, the CCCs at most grades, and DCI/PEs to a lesser degree. One reason that the DCIs/PEs is slightly lower is that panelists interpreted the alignment task for the DCIs as requiring alignment of the DCIs within specific PEs. The alignment of PLD elements and test items to SEPs and CCCs is detailed in Table 22 by grade.

These findings are further detailed in Table 23, which shows the alignment to each Dimension within each grade by the number of aligned items, the percentage of these items that matched the DOK target(s) (i.e., at the same level), and the percentage that were at or above the DOK target(s). From a DOK perspective, a large proportion of items matched the DOK target of the aligned dimension, and a slightly larger proportion were at or above the DOK target of the aligned standards. This similarity (between at DOK target and at/above DOK target) is likely due to the high DOK targets set for each grade.

Table 20. Percentage of Science Items by DOK Level

Grade	DOK 1	DOK 2	DOK 3
3	21%	45%	34%
4	13%	62%	25%
5	24%	60%	16%
6	17%	59%	23%
7	8%	50%	42%
8	17%	46%	38%
EHS	13%	56%	31%

Table 21. Alignment of Test Items by Grade to Each Dimension

Grade	Items /form	Avg. Aligned	Percent	Range	DCIs (PEs)	CCCs	SEPs	Not
3	38	35.7	94%	89% - 100%	36%	89%	93%	6%
4	38	37.0	97%	95% - 100%	35%	95%	95%	3%
5	38	36.3	96%	95% - 97%	0%	43%	96%	4%
6	42	41.0	98%	95% - 100%	0%	56%	96%	2%
7	42	39.7	94%	88% - 100%	42%	49%	92%	6%
8	44	43.3	98%	98% - 100%	17%	80%	94%	2%
EHS	44	44.0	100%	100% - 100%	12%	90%	100%	0%

Table 22. Alignment of PLD Elements and Test Items (Average across Forms) of SEPs and CCCs by Grade

	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8		EHS	
	PLD	Items	PLD	Items	PLD	Items	PLD	Items	PLD	Items	PLD	Items	PLD	Items
Science and Engineering Practices														
Developing and using Models	8	< 1	16	< 1	3	< 1	3	< 1	57	< 1	69	1.3	3	< 1
Planning and Carrying out Investigations	0	10.0	0	4.0	1	< 1	0	2.7	31	33.0	37	36.3	32	10.7
Analyzing and Interpreting Data	7	2.7	15	2.0	17	1.7	11	3.7	19	3.7	23	7.7	11	1.3
Using Mathematics and Computational Thinking	35	30.0	53	30.3	20	10.0	16	9.0	69	26.7	86	28.3	27	36.0
Constructing Explanations (for Science) and Designing Solutions (for Engineering)	14	15.3	26	21.3	16	8.7	12	6.0	19	15.3	24	18.0	18	13.7
Engaging in Argument from Evidence	6	2.3	13	3.0	6	< 1	0	2.7	14	5.0	27	4.0	6	2.0
Obtaining, Evaluating, and Communicating Information	0	1.3	2	< 1	9	1.3	11	1.0	2	< 1	5	< 1	26	8.7
Developing and Using Models	35	12.3	59	7.3	10	14.3	28	14.3	6	< 1	9	< 1	29	19.0
Crosscutting Concepts														
Patterns	29	6.7	46	5.7	10	5.0	9	1.0	70	24.0	89	28.3	35	25.3
Cause and Effect	11	5.7	21	6.7	25	6.7	9	6.0	18	11.7	30	21.7	20	8.0
Scale, Proportion, and Quantity	32	25.0	52	29.7	4	4.0	2	9.3	15	7.3	18	13.0	19	30.7
Systems and System Models	11	6.0	14	1.7	14	< 1	20	3.7	35	5.3	43	16.7	36	4.7
Energy and Matter	0	1.3	0	8.0	0	0.7	0	1.3	0	1.0	0	5.0	0	< 1
Structure and Function	5	8.0	6	2.0	0	< 1	0	< 1	3	< 1	3	1.0	0	< 1
Stability and Change	8	8.3	14	10.3	0	< 1	0	1.3	0	< 1	0	2.3	0	< 1

Table 23. Alignment and DOK Comparison of Test Items by Grade and Dimension

Grade/Domain	Items (Avg.)	At DOK Target		At/Above DOK Target	
		Avg.	Range	Avg.	Range
Grade 3					
Science and Engineering Practices	74.7	71%	58% - 77%	71%	58% - 77%
Crosscutting Concepts	61.0	77%	71% - 84%	77%	71% - 84%
Disciplinary Core Ideas/Performance Expectations	15.7	56%	47% - 69%	65%	53% - 77%
Grade 4					
Science and Engineering Practices	69.0	83%	82% - 84%	83%	82% - 84%
Crosscutting Concepts	64.0	72%	67% - 76%	72%	67% - 76%
Disciplinary Core Ideas/Performance Expectations	18.0	16%	13% - 20%	18%	13% - 25%
Grade 5					
Science and Engineering Practices	36.7	60%	56% - 68%	60%	56% - 68%
Crosscutting Concepts	16.7	88%	82% - 94%	88%	82% - 94%
Disciplinary Core Ideas/Performance Expectations	0.0	--	--	--	--
Grade 6					
Science and Engineering Practices	40.0	69%	60% - 81%	69%	60% - 81%
Crosscutting Concepts	23.3	89%	78% - 96%	89%	78% - 96%
Disciplinary Core Ideas/Performance Expectations	0.0	--	--	--	--
Grade 7					
Science and Engineering Practices	84.3	88%	83% - 93%	90%	83% - 94%
Crosscutting Concepts	50.0	95%	94% - 97%	95%	94% - 97%
Disciplinary Core Ideas/Performance Expectations	20.3	19%	0% - 35%	21%	0% - 42%
Grade 8					
Science and Engineering Practices	95.7	81%	71% - 86%	81%	71% - 86%
Crosscutting Concepts	88.0	85%	81% - 91%	85%	81% - 91%
Disciplinary Core Ideas/Performance Expectations	8.0	19%	6% - 33%	19%	6% - 33%
EHS (Algebra & Geometry)					
Science and Engineering Practices	91.3	71%	54% - 92%	71%	54% - 92%
Crosscutting Concepts	69.7	72%	56% - 90%	72%	56% - 90%
Disciplinary Core Ideas/Performance Expectations	6.3	52%	25% - 100%	52%	25% - 100%

There were a few key findings that emerged when reviewing the results across the three tasks.

- Across all grades, the panels interpreted the DCIs as limited to the expectations expressed in the PEs. Given the specificity of the PEs, there is limited alignment to these high-level expectations.
- The PLD elements and ACT Aspire test content was largely aligned to the SEPs across all grades.
- The PLD elements and ACT Aspire test content were largely aligned to the CCCs across all grades.
- In reviewing the PEs, the panels set moderate to high expectations for DOK across all grades. In general, some of the PLD elements and ACT Aspire test content met these higher expectations but not completely.
- These findings from the consensus ratings, along with the summative comments provided by the panelists (see next section), suggest they identified a strong connection with the skills (CCCs and SEPs) necessary to demonstrate the PEs but limited connection with the content of the PEs themselves.

Evaluation

In total, 83 participants completed the survey out of 86 that completed the full alignment study (the meeting started with 89 panelists, but three panelists had to leave early). The results can be found in Table 24 below. As shown by the average ratings (in total and by panel), the panelists felt prepared to complete each of the alignment tasks, that sufficient time was dedicated to training, were confident in the tasks they completed, and had enough time to complete the alignment tasks. The only exception to this was a few ratings within one Science panel indicating that more time would be desired on the second and third tasks.

Table 24. Evaluation Results by Panel

		Average	Math	Science	ELA
Rate how well the training prepared you for each of the alignment tasks					
1 = Not Prepared, 2 = Prepared, 3 = Very Prepared					
	Task 1: Review of Standards and identification of cognitive complexity targets	2.53	2.39	2.36	2.71
	Task 2: Alignment of the ACT Aspire PLDs to the Standards	2.30	2.09	2.00	2.61
	Task 3: Alignment of the ACT Aspire test content to the Standards	2.51	2.43	2.18	2.74
Rate the amount of time dedicated to training on each of the alignment tasks					
1 = Not Enough Time, 2 = Enough Time, 3 = Too Much Time					
	Task 1: Review of Standards and identification of cognitive complexity targets	2.01	1.96	2.00	2.05
	Task 2: Alignment of the ACT Aspire PLDs to the Standards	1.88	1.74	1.86	1.97
	Task 3: Alignment of the ACT Aspire test content to the Standards	1.96	2.00	1.91	1.97
Rate your confidence in each of the alignment tasks you completed					
1 = Not Very Confident, 2 = Somewhat Confident, 3 = Very Confident					
	Task 1: Review of Standards and identification of cognitive complexity targets	2.82	2.70	2.91	2.84
	Task 2: Alignment of the ACT Aspire PLDs to the Standards	2.49	2.17	2.36	2.76
	Task 3: Alignment of the ACT Aspire test content to the Standards	2.75	2.70	2.68	2.82

Rate the amount of time dedicated to each of the alignment tasks you completed *1 = Not Enough Time, 2 = Enough Time, 3 = Too Much Time*				
Task 1: Review of Standards and identification of cognitive complexity targets	1.99	1.91	2.00	2.03
Task 2: Alignment of the ACT Aspire PLDs to the Standards	1.82	1.83	1.55	1.97
Task 3: Alignment of the ACT Aspire test content to the Standards	1.81	1.91	1.55	1.89
Rate the overall experience of the alignment study *1 = Unsuccessful, 2 = Somewhat Successful, 3 = Very Successful*				
Response	2.82	2.61	2.91	2.89

Panelists were also able to provide comments on the evaluation regarding either the alignment of the ACT Aspire or the alignment study. These were further analyzed for future process improvement.

Validity evidence supporting results

To evaluate the alignment study, we applied the framework suggested by Davis-Becker and Buckendahl (2013). Within this framework, the authors suggested four sources of evidence that should be considered in the validation process: procedural, internal, external, and utility. Threats to validity that were observed in these areas should mitigate policymakers' judgments regarding the usefulness of the results and the validity of the interpretation. Evidence within each of these areas that was observed in this study is discussed here.

Procedural

Procedural evidence was available when considering panelist selection and qualifications, choice of methodology, application of the methodology, and panelists' perspectives about the implementation of the methodology. For this study, the panel that was recruited included experienced educators and content specialists in various roles from across the state. In addition, the panelists were independent of any development and validation activities for the ACT Aspire. The methodology applied was designed around the specific alignment questions to be addressed, the structure of the ACT Aspire, and the Arkansas content standards. Panelists' perspectives on the process were collected, and the evaluation responses were consistently positive.

Internal

The internal evidence for alignment studies can be evaluated by examining the consistency of panelists' ratings and the convergence of the recommendations. For this study, the rating tasks and decision rules were based on consensus judgments. Although the results should not be interpreted as unanimous support by the panelists, the panelists worked well together in evaluating differences of opinion to determine the most appropriate consensus judgment. This is evidenced based on the evaluation ratings and comments provided by panelists at the end of the study. In addition, the results were very similar between the PLD review and the test form review across all three subjects (see summary in next section).

External

The primary source of external evidence for the study comes from the panelists for the study who served as independent evaluators of the assessment design, development, and review process. Because this alignment study was not designed as a confirmatory process, the relationship between the developer's intent and the independent panelists served as the cross-validation expected in an independent study.

Utility

Evidence of utility is based largely on the extent to which the summative and formative feedback can be used to inform policy and operational decisions related to the use of the ACT Aspire. We believe that the summative information from the study suggests that the ACT Aspire test content meets the expectations outlined in the Arkansas standards at the domain level for ELA and Mathematics. With respect to Science, the panels identified alignment to the SEP and CCCs but limited connection to the grade-level operationalization of the DCIs through the PEs.

Summary

This report summarizes the alignment activities completed for the alignment of the ACT Aspire to the Arkansas state standards. Educators from across the state of Arkansas convened during a four-day workshop and completed an alignment of the ACT Aspire using the overall state standards, ACT Aspire Performance Level Descriptors, and the ACT Aspire test items. Reviewing the results presented in this report, a number of key findings were observed which are organized below by key research questions.

What level of cognitive processing is expected for students at each grade level for each standard or expectation?

Across all three subject areas, the panels found that the standards would likely require students to demonstrate a range of DOK levels at each grade level. For ELA and Mathematics, these targets were largely centered on levels 1-3 with a few specific standards targeting DOK level 4. For Science, these targets were slightly higher as the performance expectations are written to be encompassing of multiple expectations.

How do the ACT Aspire PLDs reflect the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?

The PLDs represent the full range of knowledge and skills that could be assessed from this domain on a form of the ACT Aspire but are likely larger and more all-encompassing than any one test form could be. Therefore, although aligning the PLDs provides a different perspective (compared to the test content), these results should be interpreted with caution as some of the elements within these descriptors are less specific than how test items are operationalized. That being said, the panels largely found alignment of the PLD elements to the Arkansas content standards.

- In ELA, the panels largely found the PLD elements to align and had similar expectations in terms of DOK. In Reading specifically, several of the lower grade panels found a number of elements that were identified as either aligning to a lower grade level or not aligning.
- In Mathematics, most panels found the majority of PLD elements to align to the Standards (and/or mathematical practices) and had similar expectations in terms of DOK. At the higher grade levels, a substantial percentage of the PLD elements were found to best align to lower grade level standards.
- In Science, the panels largely found alignment to the science and engineering practices and the crosscutting concepts. There were somewhat similar expectations in terms of DOK as the DOK expectations for each grade level were on the higher end of the scale. However, the PLD elements were largely in the middle of the scale. They also concluded that the specific elements could likely

be aligned to any/all of the disciplinary core ideas depending on the context in which they were written.

How does the ACT Aspire test content measure the knowledge and skills defined within the Arkansas standards AND demonstrate a level of cognitive complexity consistent with the level deemed appropriate/necessary for that standard(s)?

Each panel reviewed three forms of the test to have a sample of the knowledge and skills that could be tested as well as the possible differences that may exist across forms. The results presented across subjects and grades identified a number of similarities but also some differences across the forms.

- In ELA, the panels largely found the test items to align and had similar expectations in terms of DOK. In Reading, several of the lower grade panels found a number of items (testing specific concepts) that were identified as either aligning to a lower grade level or not aligning. In addition, there was some alignment to the anchor standards indicating the skills being measured were part of the overall goals for student learning but not specific to the focal grade.
- In Mathematics, most panels found the majority of test items to align to the Standards (and/or mathematical practices) and had similar expectations in terms of DOK. At the higher grade levels, a substantial percentage of the items were found to best align to lower grade level standards.
- In Science, the panels largely found alignment to the science and engineering practices and the crosscutting concepts. There were somewhat similar expectations in terms of DOK as the DOK expectations for each grade level were on the higher end of the scale. However, the PLD elements were largely in the middle of the scale. They also concluded that the items did not directly align to the DCIs based on how each was operationalized through the PEs.

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Appendix A: Intended Connection between ACT Reporting Categories and Domains within Arkansas State Standards

The information within this Appendix was provided by ACT as contextual background describing how the ACT Aspire Assessment is intended to align to the Arkansas academic content standards in ELA, Mathematics, and Science.

English Language Arts

In English Language Arts, the relationship between the ACT Aspire reporting categories and the Arkansas Standards is straightforward and intentional. In most cases the ACT Aspire reporting categories have direct conceptual alignment to the content categories in the Arkansas standards. The clearest illustration of this is in reading, where the ACT Aspire reporting categories have the same names as the "clusters" in the Arkansas Reading strands.
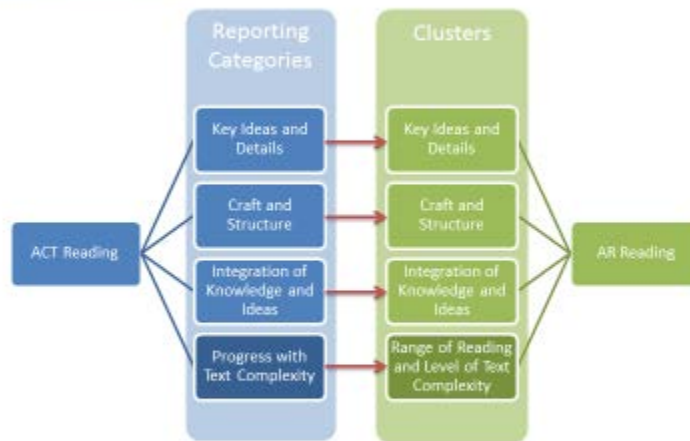
The same nominal and conceptual alignment exists in the reporting categories for the ACT Aspire English and writing tests, but these tests target skills across the Arkansas language and writing strands. Nonetheless, the names of the ACT Aspire reporting categories indicate clear conceptual linkages with the clusters in the Arkansas standards (e.g., ACT Aspire "Production of Writing" > AR "Production and Distribution of Writing"). It should be kept in mind, however, that the ACT Aspire English and writing tests both target various aspects of the Arkansas language and writing strands, so there is considerable overlap between the domains of these tests.

The overlap between ACT Aspire English and writing reporting categories reflects the integrated design of the Arkansas ELA standards themselves. For example, the Arkansas Language strand has a "Vocabulary Acquisition and Use" cluster with standards that refer to reading and writing. The result of this integration across the Arkansas standards is that some ACT Aspire reporting categories target skills in multiple AR clusters. The ACT Aspire reading test reporting category "Craft and Structure" includes test content that measures student Vocabulary Acquisition and Use. This is to be expected given the integrated nature of Arkansas' ELA standards. Ultimately, the ACT Aspire ELA reporting categories allow for an extremely clear interpretation of scores according to the Arkansas ELA framework clusters and standards.

ELA Assessments: Reading

Reporting Categories and Claim Structure

Reporting Categories

- Key Ideas and Details
- Craft and Structure
- Integration of Knowledge and Ideas
- Progress with Text Complexity

ACT Reading

Clusters

- Key Ideas and Details
- Craft and Structure
- Integration of Knowledge and Ideas
- Range of Reading and Level of Text Complexity

AR Reading

ACT Aspire

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ELA Assessments: English

Reporting Categories and Claim Structure

ACT Reporting Categories

- Production of Writing
- Knowledge of Language
- Conventions of Standard English

ACT English

AR Clusters

- Production and Distribution of Writing
- Knowledge of Language
- Vocabulary Acquisition and Use*
- Conventions of Standard English

AR Writing

AR Language

*Also measured by ACT Aspire reading test

ACT Aspire

12
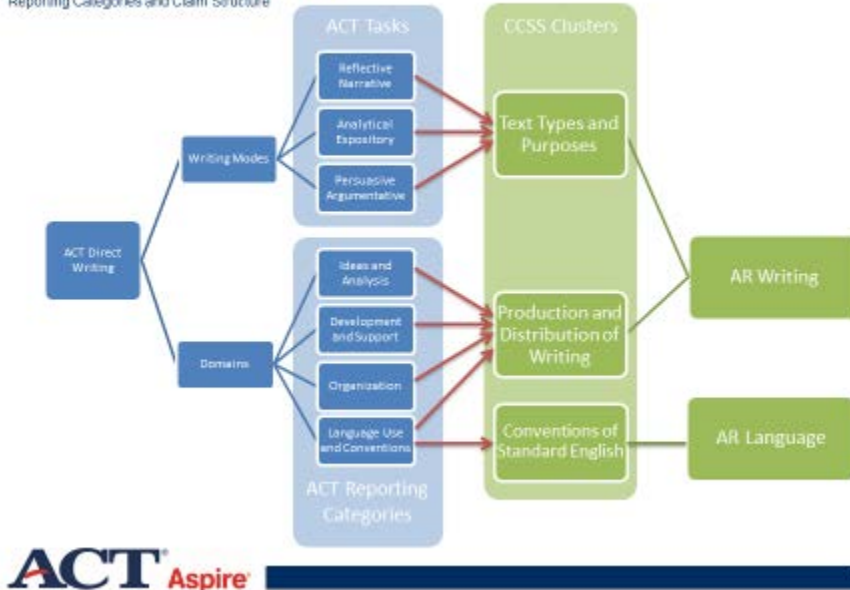
Mathematics

ACT Aspire mathematics tests are structured around the same domains as the Arkansas Mathematics Standards. Each form has a consistent distribution of content defined by the domains appropriate for the grade. Each form challenges students with a range of complexity, thinking skills, and contexts. The diagram below shows domain correspondence for grades 3–5. Other grades have the same direct relationship between Arkansas domains and ACT Aspire reporting categories.
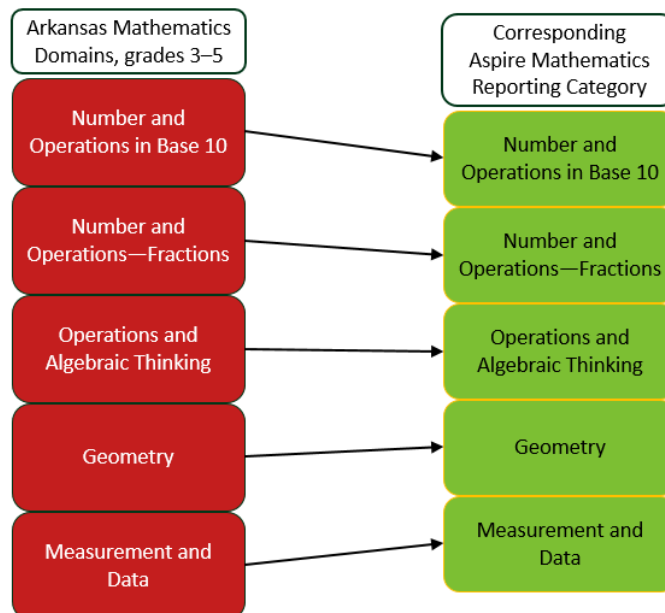
Science

ACT's science tests assess and report on science knowledge, skills, and practices across three domains, which are also reporting categories for all ACT and ACT Aspire Science Tests:

- Interpretation of Data
- Scientific Investigation
- Evaluation of Models, Inferences, and Experimental Results

The science knowledge, skills, and practices that are assessed on ACT's science tests are highly represented in the Arkansas Science Standards and are contained primarily in two of its three dimensions: Science and Engineering Practices and Crosscutting Concepts. They are also a major component of the Performance Expectations. While ACT's science tests are focused on science skills and practices, all questions are based on discipline-specific science content from the ACT science content domain, which encompasses the science content in the third dimension of the Arkansas Science Standards, the Disciplinary Core Ideas. Measuring student performance at the intersection between science content and science skills and practices is central to ACT's science tests and to the Arkansas Science Standards.

The following table indicates how strongly each of the three dimensions of the Arkansas Science Standards map to each of the three reporting categories of ACT's science tests.

Arkansas Science Standards	ACT Reporting Categories		
CROSSCUTTING CONCEPTS	**IOD**	**SIN**	**EMI**
1. *Patterns*	**Very Strong**	Moderate	**Very Strong**
2. *Cause and Effect*	**Strong**	Moderate	**Very Strong**
3. *Scale, Proportion, and Quantity*	**Very Strong**	Moderate	**Very Strong**
4. *Systems and System Models*	Moderate	Moderate	**Very Strong**
5. *Energy and Matter**	Moderate	Moderate	Moderate
6. *Structure and Function*	Moderate	**Strong**	**Very Strong**
7. *Stability and Change*	Moderate	**Strong**	**Very Strong**
Overall Alignment	**Strong**	Moderate	**Very Strong**
SCIENCE & ENGINEERING PRACTICES	**IOD**	**SIN**	**EMI**
1. *Asking questions and defining problems*	**Moderate**	**Strong**	**Strong**
2. *Developing and using models*	**Strong**	**Strong**	**Very Strong**
3. *Planning and carrying out investigations*	**Strong**	**Very Strong**	**Strong**
4. *Analyzing and interpreting data*	**Very Strong**	Moderate	**Very Strong**
5. *Using mathematics and computational thinking*	**Strong**	Moderate	**Strong**
6. *Constructing explanations and designing solutions*	**Strong**	**Strong**	**Strong**
7. *Engaging in argument from evidence*	**Very Strong**	Moderate	**Very Strong**
8. *Obtaining, evaluating, and communicating information*	**Very Strong**	**Very Strong**	**Very Strong**

Overall Alignment	Strong	Strong	Very Strong
DISCIPLINARY CORE IDEAS	**IOD**	**SIN**	**EMI**
1. *Physical Science**	Moderate	Moderate	Moderate
2. *Life Science**	Moderate	Moderate	Moderate
3. *Earth and Space Science**	Moderate	Moderate	Moderate
4. *Engineering, Technology, and Applications of Science***	Moderate	**Strong**	**Strong**
Overall Alignment	Moderate	Moderate	Moderate

*Physical, Life, and Earth & Space Science, as well as Energy and Matter from the Crosscutting Concepts, are considered part of the ACT & ACT Aspire Science Content Domain. While all three domains are represented on every test form (and Energy and Matter is well represented across forms), Science and Engineering Practices and Crosscutting Concepts are strongly emphasized and most tightly align to the three reporting categories of the ACT and ACT Aspire Science Tests.

**Engineering is not a domain of the ACT and ACT Aspire Science Tests, but students must apply their science knowledge, skills, and practices to solve problems in real-world situations on every test form.

This table shows that, due to the interconnected nature of the eight Science and Engineering Practices and the seven Crosscutting Concepts, both within each set and also across each set, and the overarching nature of the three reporting categories of ACT's science tests, all of the Science and Engineering Practices and Crosscutting Concepts map to all three of the reporting categories. Because those practices and concepts are assessed on ACT's science tests within content from each of the domains of the Disciplinary Core Ideas, those also map to ACT's science tests. This is illustrated in the following graphic.
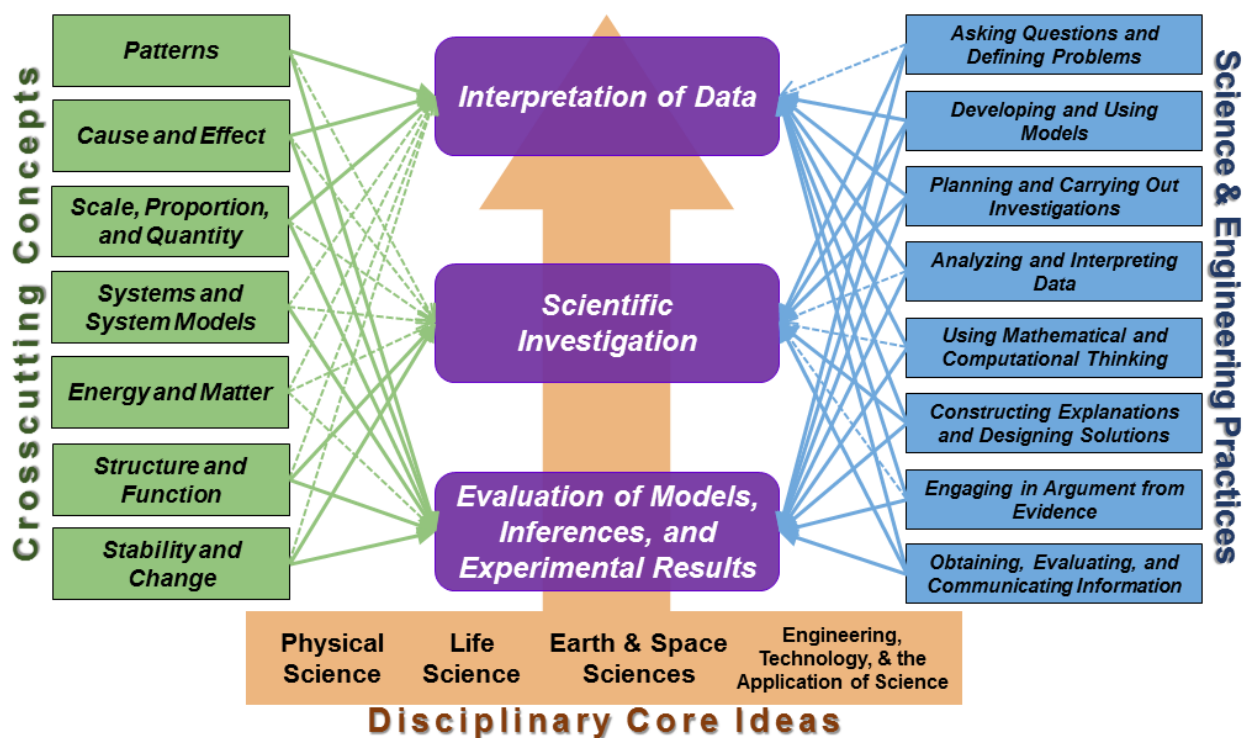
Appendix B: Study Materials

Orientation and Training Slides

General Orientation.pdf

Training ELA.pdf

Training Math.pdf

Training Science.pdf

DOK Resources

DOK ELA.pdf

DOK Math.pdf

DOK Science.pdf

Example Rating Forms

Task 1 - ELA Grade 3

Task 2 - Mathematics Grade

Task 3 - Science Grade 3

Appendix C: PLD Alignment by DOK

The alignment results for the PLD elements were further analyzed by DOK. These results are presented below by content area.

English Language Arts

Table B.1 shows the alignment to each conceptual organizer within each grade by the number of aligned elements, the percentage of these elements that matched the DOK target(s) (i.e., element was at the same level of the standard) and the percentage that were at or above the DOK target(s). Overall, most of the PLD content aligned to the grade-level standards with some better matching standards at below grade levels and a small percentage where alignment could not be found. In addition, a large portion of items at each grade/domain met the DOK target of the aligned standards, and almost all met or exceeded the DOK target of the aligned standard. As a way of evaluating these results, Webb suggests that a reasonable benchmark for consistency between the assessment and the standards is that 50% or more of the items aligned should be at or above the DOK level of the standard. Largely, the results by conceptual organizer meet this expectation with the exception of a few specific areas within each grade level.

Table B.1 Alignment and DOK Comparison of PLD Elements by Grade and Conceptual Organizer

	Reading PLDs			English PLDs		
	Aligned PLD Elements	At DOK Target	At/Above DOK Target	Aligned PLD Elements	At DOK Target	At/Above DOK Target
Grade 3						
Key Ideas and Details	105	64%	93%	7	14%	14%
Craft and Structure	71	61%	76%	0		
Integration of Knowledge and Ideas	23	57%	57%	4	100%	100%
Text Type and Purposes	0			11	82%	100%
Production and Distribution of Writing	0			8	88%	100%
Research to Build and Present Knowledge	0			1	100%	100%
Conventions of Standard English	0			37	43%	100%
Knowledge of Language	0			3	0%	100%
Vocabulary Acquisition and Use	0			3	100%	100%
Grade 4						
Key Ideas and Details	66	67%	91%	1	0%	0%
Craft and Structure	38	29%	63%	0		
Integration of Knowledge and Ideas	18	83%	89%	0		
Text Type and Purposes	0			42	67%	67%
Production and Distribution of Writing	0			9	89%	89%
Research to Build and Present Knowledge	0			0		
Conventions of Standard English	0			18	78%	89%
Knowledge of Language	0			9	67%	78%

Vocabulary Acquisition and Use	0			0		
Grade 5						
Key Ideas and Details	70	61%	89%	1	0%	0%
Craft and Structure	57	56%	68%	2	0%	0%
Integration of Knowledge and Ideas	25	72%	72%	1	0%	0%
Text Type and Purposes	0			9	33%	33%
Production and Distribution of Writing	0			13	0%	0%
Research to Build and Present Knowledge	3	100%	100%	0		
Conventions of Standard English	1	100%	100%	25	52%	100%
Knowledge of Language	5	100%	100%	7	100%	100%
Vocabulary Acquisition and Use	0			1	0%	100%
Grade 6						
Key Ideas and Details	34	59%	76%	2	100%	100%
Craft and Structure	27	33%	33%	4	0%	0%
Integration of Knowledge and Ideas	18	6%	6%	0		
Text Type and Purposes	0			32	0%	0%
Production and Distribution of Writing	0			18	0%	0%
Research to Build and Present Knowledge	0			0		
Conventions of Standard English	0			21	90%	100%
Knowledge of Language	0			18	72%	83%
Vocabulary Acquisition and Use	0			0		
Grade 7						
Key Ideas and Details	127	72%	72%	1	100%	100%
Craft and Structure	127	61%	61%	13	46%	46%
Integration of Knowledge and Ideas	32	44%	44%	0		
Text Type and Purposes	0			40	63%	63%
Production and Distribution of Writing	0			11	64%	64%
Research to Build and Present Knowledge	0			0		
Conventions of Standard English	0			53	62%	91%
Knowledge of Language	0			12	50%	50%
Vocabulary Acquisition and Use	0			3	0%	100%
Grade 8						
Key Ideas and Details	48	77%	94%	1	100%	100%
Craft and Structure	41	80%	85%	8	75%	100%
Integration of Knowledge and Ideas	22	64%	64%	0		
Text Type and Purposes	0			25	60%	68%
Production and Distribution of Writing	0			25	80%	80%
Research to Build and Present Knowledge	0			0		

Conventions of Standard English	0			48	67%	73%
Knowledge of Language	0			15	0%	100%
Vocabulary Acquisition and Use	0			25	12%	76%
EHS						
Key Ideas and Details	138	59%	93%	0		
Craft and Structure	116	79%	84%	25	100%	100%
Integration of Knowledge and Ideas	22	55%	55%	0		
Text Type and Purposes	0			57	63%	63%
Production and Distribution of Writing	0			44	61%	77%
Research to Build and Present Knowledge	0			2	0%	0%
Conventions of Standard English	0			92	60%	95%
Knowledge of Language	0			39	90%	92%
Vocabulary Acquisition and Use	0			14	29%	57%

Mathematics

Table B.2 shows the alignment to each domain within each grade by the number of aligned elements, the percentage of these elements that matched the DOK target(s) (i.e., element was at the same level of the standard) and the percentage that were at or above the DOK target(s). Overall, most of the PLD content aligned to the grade-level expectations within the standards (and practices) with some matching standards at below grade levels and a small percentage where alignment could not be found. In addition, a large portion of items at each grade/domain met the DOK target of the aligned standards, and almost all met or exceeded the DOK target of the aligned standard. Application of Webb's criterion of 50% of aligned items at/above expectations for standards suggests that all domains and grades met this target.

Table B.2 Alignment and DOK Comparison of PLD Elements by Grade and Domain

	Aligned PLD Elements	At DOK Target	At/Above DOK Target
Grade 3			
Operations and Algebraic Thinking	54	89%	94%
Numbers and Operations in Base Ten	4	100%	100%
Numbers and Operations - Fractions	19	63%	84%
Measurement and Data	26	65%	85%
Geometry	20	85%	100%
Grade 4			
Operations and Algebraic Thinking	23	91%	96%
Numbers and Operations in Base Ten	25	76%	80%
Numbers and Operations - Fractions	42	74%	74%
Measurement and Data	9	56%	78%
Geometry	12	92%	100%
Grade 5			
Operations and Algebraic Thinking	24	67%	83%

Numbers and Operations in Base Ten	34	68%	100%
Numbers and Operations - Fractions	39	64%	85%
Measurement and Data	45	56%	93%
Geometry	47	45%	91%
Grade 6			
Ratios and Proportional Relationships	29	76%	100%
The Number System	43	44%	100%
Expressions and Equations	47	30%	100%
Geometry	47	62%	100%
Statistics and Probability	42	76%	100%
Grade 7			
Ratios and Proportional Relationships	39	67%	95%
The Number System	33	82%	100%
Expressions and Equations	45	64%	87%
Geometry	95	87%	98%
Statistics and Probability	25	72%	84%
Grade 8			
The Number System	18	56%	78%
Expressions and Equations	65	72%	92%
Functions	31	71%	74%
Geometry	46	83%	98%
Statistics and Probability	21	90%	100%
EHS (Algebra & Geometry)			
Number and Quantity	21	52%	86%
Algebra	50	60%	74%
Functions	35	46%	57%
Statistics and Probability	9	78%	78%
Geometry	72	69%	72%

Science

The alignment of the Science PLD elements was reviewed by dimension with respect to DOK (see Table B.3). Because the elements could potentially align to all DCIs (and PEs), the distribution of DOK ratings for the elements is compared to the distribution of DOK targets for the grade level (see Table 20). In general, the grade-level targets seemed to be focused on the higher DOK levels (3 and 4) whereas the PLD elements were spread mostly across DOK levels 1-3.

Table B.3 Comparison of Grade-level DOK Targets and PLD DOK

Grade	Total Elements	Grade Level Targets				PLD DOK			
		DOK 1	DOK 2	DOK 3	DOK 4	DOK 1	DOK 2	DOK 3	DOK 4
3	59	0%	61%	44%	11%	27%	53%	19%	0%
4	83	0%	12%	76%	12%	17%	52%	31%	0%
5	89	0%	13%	88%	0%	20%	35%	44%	1%

6	88	0%	0%	55%	45%	33%	43%	24%	0%
7	105	0%	14%	59%	32%	19%	41%	34%	6%
8	117	0%	12%	52%	40%	11%	36%	44%	9%
EHS	106	11%	15%	65%	31%	32%	32%	35%	1%

For each of the SEPs and CCCs, the DOK targets were determined by combining the targets for the PEs for which each SEP or CCC was included (i.e., summarizing how each SEP or CCC was operationalized at each grade). These findings are detailed in Table B.4.

Table B.4 Alignment and DOK Comparison of PLD Elements for SEPs and CCCs

	Aligned PLD Elements	At DOK Target	At/Above DOK Target
Grade 3			
Science and Engineering Practices	105	77%	77%
Crosscutting Concepts	96	82%	82%
Grade 4			
Science and Engineering Practices	184	73%	73%
Crosscutting Concepts	153	56%	56%
Grade 5			
Science and Engineering Practices	82	70%	70%
Crosscutting Concepts	53	77%	77%
Grade 6			
Science and Engineering Practices	81	23%	23%
Crosscutting Concepts	40	40%	40%
Grade 7			
Science and Engineering Practices	217	71%	73%
Crosscutting Concepts	141	74%	77%
Grade 8			
Science and Engineering Practices	280	86%	86%
Crosscutting Concepts	183	85%	85%
EHS (Biology & Physical Sciences)			
Science and Engineering Practices	152	100%	100%
Crosscutting Concepts	110	100%	100%

Appendix D: Panel level comments on Text Complexity within Grade-Level ELA

After reviewing three forms of the ACT Aspire assessment, each panel was asked to consider the text passages that were part of the test content. Specifically, they were asked to evaluate whether the text complexity was appropriate for the grade-level and provide any thoughts they had on this subject. Their responses (verbatim) are below.

Grade 3: We have 2nd graders in Arkansas reading decodable texts. If second graders enter 3rd grade still reading decodable texts, we are concerned the text complexity of 3rd grade ACT Aspire is too challenging. Is the text complexity of decodable passages comparable to the text complexity on ACT Aspire?

Grade 4: The reading test had at least four texts (particularly non-fiction) that were far above level, with vocabulary unnecessary to the questions asked. There were passages on both the reading and English with words from foreign languages. On the English test, some passages were longer than necessary. About 1/3 of the passages were above grade level. We believe the Lexile band for our grade is too broad. Due to vocabulary and domain specific language in non-fiction, it should be from the lower end of that range.

Grade 5: Yes, the level of complexity is appropriate for the grade-level. The texts are interesting for 5th graders, are not too complex, and are of an appropriate length. The only reservation we have is that some of the character names were so difficult to read that students might get hung up on the name and not move quickly to the rest of the text.

Grade 6: Literary and informational passages' text complexity fell within the grade-level span. Vocabulary in the information texts was within the grasp of a 6th grader's level of understanding. None of the texts appeared to be excessively lengthy and therefore acceptable for 6th graders to be able to utilize during the time allotted.

Grade 7: Complexity is not too hard, and we question if they are low regarding Lexile level. We question the relevancy/interest levels. There were no significant text features within the texts and no questions that probe kids to identify what could have been a text feature. Everything our students are asked to do between two texts are not addressed in our standards. The literary choices are not literary – adding a literary nonfiction feels like we are limiting our scope of questions that can be asked that would not cover literary standards. English test had lengthy passages to analyze in comparison to the time they are given (45 questions in 40 minutes).

Grade 8: We think the text complexity of the passages on the Reading test was appropriate. The complexity of the passages was appropriate to the tasks for the English test.

HS: For Reading, the text complexity seemed above expectations for grade-level. Many on-level students would have found the passages challenging to perform the tasks, much less comprehend. For English, most text here seemed accessible, but it's hard to judge this because there are single-sentence items and out-of-context items. The text for the Writing prompt was confusing but not complex.